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RESEARCH

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## COMPARATIVE ANALYSIS OF STUDENTS IN NURSING PERFORMANCE ON TRANSFUSIONAL SECURITY

Análise comparativa do desempenho dos discentes em enfermagem sobre segurança transfusional

Análisis comparativo del rendimiento de los estudiantes en enfermería acerca de la seguridad de la sangre

*Bruna Ketlin Silva dos Santos Clem<sup>1</sup>, Savya Mendonça Gomes da Silva<sup>2</sup>, Sylvia Silva do Nascimento Oliveira<sup>3</sup>, Ângela Maria La Cava<sup>4</sup>*

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### ABSTRACT

**Objective:** to analyze the performance of students submitted to training on the role of nurses in the blood therapy process, in comparison with those who did not receive training. **Method:** It is an exploratory research, with a quantitative approach. For data collection, a structured questionnaire was used with undergraduate nursing students in the last year of the course and submitted to descriptive statistical analysis. **Results:** the students who participated in the training obtained greater positive results than those who did not participate, stressing the importance of investing in addressing the theme during undergraduate nursing, especially in supervised internships, reinforcing the knowledge acquired, reaching the maximum levels for quality care. **Conclusion:** Through the results obtained, it became evident the need for greater emphasis on the theme during the completion of the course, in order to guarantee safe assistance.

**DESCRIPTORS:** Blood transfusion; Patient safety; Students nursing; Learning.

- 1 Bachelor in nursing, postgraduate student in clinical medical and general surgical nursing, nurse resident, Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro, Brazil. ORCID: 0000-0002-3021-5251
- 2 Bachelor in nursing, MBA in health management and hospital administration. Resident nurse, Universidade Federal do Estado do Rio de Janeiro, Rio de Janeiro, Brazil. ORCID: 0000-0001-6135-5954
- 3 Bachelor in nursing, graduate student in clinical medical and general surgical nursing, nurse resident, Federal University of the State of Rio de Janeiro, Rio de Janeiro, Brazil. ORCID: 0000-0002-9699-514X
- 4 PhD in nursing, Full Professor of DEMI/EEAP/UNIRIO. ORCID: 0000-0003-4173-8557

## RESUMO

**Objetivo:** analisar o desempenho dos discentes submetidos a treinamento sobre a atuação do enfermeiro no processo hemoterápico, em comparação com os que não receberam treinamento. **Método:** Trata-se de uma pesquisa exploratória, de abordagem quantitativa. Para a coleta de dados, utilizou-se um questionário estruturado com discentes de graduação em enfermagem do último ano de curso e submetido a análise estatística descritiva. **Resultados:** os alunos que participaram do treinamento obtiveram maiores resultados positivos do que aqueles que não participaram, salientando a importância de investir na abordagem do tema durante a graduação em enfermagem, especialmente nos estágios supervisionados, reforçando os conhecimentos adquiridos, alcançando os níveis máximos para qualidade assistencial. **Conclusão:** Através dos resultados obtidos, evidenciou-se a necessidade de maior ênfase sobre a temática no decorrer da finalização do curso, de modo a garantir uma assistência segura.

**DESCRIPTORES:** Transfusão de sangue; Segurança do paciente; Estudantes de enfermagem; Aprendizagem.

## RESUMÉN

**Objetivo:** analizar el desempeño de los estudiantes que reciben capacitación sobre el papel de las enfermeras en el proceso de hemoterapia, en comparación con aquellos que no recibieron capacitación. **Método:** Es una investigación exploratoria, con un enfoque cuantitativo. Para la recopilación de datos, se utilizó un cuestionario estructurado con estudiantes universitarios de enfermería en el último año del curso y se sometió a un análisis estadístico descriptivo. **Resultado:** Los estudiantes que participaron en la capacitación obtuvieron mejores resultados positivos que aquellos que no participaron, destacando la importancia de invertir en abordar el importancia de abordar la temática durante los estudios de pregrado en enfermería, especialmente en prácticas laborales supervisadas, reforzando el conocimiento adquirido, alcanzando los niveles máximos para una atención de calidad. **Conclusión:** A través de los resultados obtenidos, se hizo evidente la necesidad de un mayor énfasis en el tema durante la finalización del curso, a fin de garantizar una asistencia segura.

**DESCRIPTORES:** Transfusión sanguínea; Seguridad del paciente; Estudiantes de enfermería, Aprendizaje.

## INTRODUCTION

A recurring theme in several health agendas, patient safety has been discussed worldwide in its various aspects, being defined as the reduction, to a plausible minimum level, of the occurrence of risk of harm in the care provided to the client. In accordance with the resolution approved during the 57th World Health Assembly, in 2013 the Brazilian Ministry of Health in conjunction with the National Agency for Sanitary Surveillance (ANVISA) developed the National Program for Patient Safety (PNSP), aiming at a quality service of health care throughout the country, at public and private levels.<sup>1</sup>

Covering the various health care scenarios, the concept of patient safety is present in the entire scope of care. The nurse is a professional with the skills and competences to ensure such measures, working in several areas, among them the hemotherapy field.

Hemotransfusion is defined as the transfusion of blood, blood components, or blood products from a donor subject to a recipient subject. The technique of using blood therapeutically is called hemotherapy, being the treatment option for several pathologies and health problems.<sup>2</sup> Blood transfusion is a complex procedure, requiring scientific knowledge and skilled professionals to perform it.<sup>3</sup> Nurses are responsible for managing and ensuring the quality of blood, blood components, and blood products, providing comprehensive assistance to those involved in transfusion, namely, donors, recipients, and family members.<sup>4</sup>

Transfusion safety is a subject that is seldom addressed during undergraduate courses; however, it is part of the routine in hospital institution sectors, and it is the nursing staff's responsibility to perform transfusions and check for adverse events, intervening when necessary.<sup>5</sup> Thus, the understanding of the importance of blood transfusion for the patient, the complexity of the procedure used in several areas and levels of care, and the nurses' role in the hemotransfusion performance, show the need to deepen this issue during the undergraduate course, directly impacting the nursing care provided to patients requiring blood transfusions.

Thus, it becomes relevant the discussion of the topic to contribute to the implementation of safe practices in the hemotherapy process, influencing the rates of adverse events related to health care in this field. Considering that the current nursing students will be the professionals in charge of this procedure in the assistance, the question is whether the transfusion safety issue addressed during the undergraduate course provides effective knowledge for the practice of these future professionals.

In this perspective, the objectives of this study are to evaluate the performance of students undergoing training on the nurse's role in the blood therapy process, and to compare the performance of students undergoing training on the nurse's role in the blood therapy process, compared with those who have not received training.

## METHODOLOGY

The present study is an exploratory research with a quantitative approach.

The research was conducted at the nursing school of a federal university in the state of Rio de Janeiro. The participants were fifth-year students, over 18 years of age and regularly enrolled in the current semester disciplines, whose population was chosen due to the completion of more than 75% of the theoretical-practical disciplines of the curricular matrix. The inclusion criteria established were: to participate in all the stages of the data collection process and to be duly enrolled in the class of the 9th or 10th period.

The data were obtained through a structured questionnaire developed by the researchers. The instrument was prepared according to the current legislation on transfusion safety<sup>6-7,4</sup>; it was divided into four parts, the first containing the

participants' profile data, such as academic period, age, and gender; the second part related to self-perception about blood transfusion, with questions about feeling safe when performing the procedure and about the content covered during graduation; the third part covering the knowledge about safety barriers when preparing and performing the procedure, and the fourth part related to transfusion reactions; totaling 11 questions, presenting in parts two, three, and four, alternative answer choices.

Data collection was performed in November 2019, in three stages. In the first stage, prior contact was made with the representatives of the classes, inviting students to participate in the survey. In the second stage, through convenience sampling, the participating students were divided into two groups, A and B. Corresponding to group A, students enrolled in the 10th semester and group B, those who are enrolled in the 9th semester of the 2019/02 school year.

The third stage constituted the collection, which was carried out on a date agreed upon with both classes and carried out simultaneously by the research team. Both classes were presented with the Informed Consent Form (ICF), and then the students in group A, who agreed to participate in the research, underwent the intervention, through theoretical training in hemotherapy using active methodologies and lasting approximately one hour. After the end of the intervention, this group was submitted to the questionnaire to be answered according to the knowledge acquired during the training. The research team members did not provide any information while filling out the questionnaire. The students in group B who agreed to participate in the research only answered the questionnaire, without any previous preparation or availability of consultation materials. It is worth noting that the members of the research team did not provide any information while completing the questionnaire.

The data collected were entered into a Microsoft Office Excel spreadsheet and analyzed using descriptive statistics. The results obtained were interpreted and described in tables and graphs for analysis.

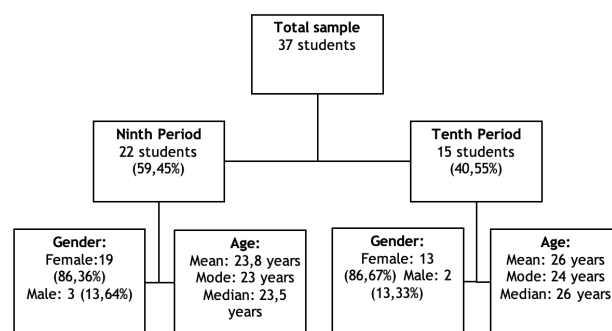
Throughout the research the anonymity of the participants was guaranteed. The risks involved in the process are considered minimal.

The study only began after approval by the Ethics and Research Committee of the University, under CAAE number 16785219.0.0000.5285, following the ethical precepts in all stages of the research, according to Resolution No. 466, December 12, 2012, of the National Health Council.<sup>8</sup>

## RESULTS

The questionnaire was answered by 37 students, 15 of whom from the 10th period attended a training course on the proposed theme, and 22 students from the 9th period attended it without any previous training.

**Figure 1 - Ninth and tenth period sociodemographic profile.**  
Rio de Janeiro, RJ, Brazil, 2019

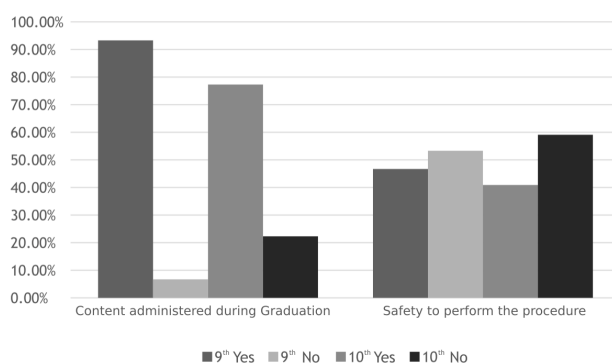


Source: Own authorship.

Figure 1 shows the sociodemographic data of the participants involved in the research, of the 37 components of the sample, 22 students (59.45%) are from the ninth period and 15 (40.55%) from the tenth period.

The questionnaire was structured in three parts of specific knowledge about the topic. In the first part, questions were asked about self-perception related to blood transfusion knowledge, as shown in Figure 2, which shows the percentages of positive and negative answers per class and grouped by question.

**Figure 2 - Comparison between the ninth and tenth periods about self-perception on hemotransfusion.** Rio de Janeiro, RJ, Brazil, 2019



Source: own authorship.

The second part of the questionnaire included questions about patient safety in the preparation and execution of the hemotherapy procedure.

Table 1 shows the students' answers to questions four, five, six and seven, which respectively refer to the following questions: According to COFEN resolution 0511/2016, is a *latu sensu* specialization in hemotherapy necessary to perform blood transfusions? The verification of patient data and the label contained in the bag of blood, blood products or blood products to be infused should be performed by two staff members; Is it recommended that the blood product be administered through an infusion pump to ensure that it does not exceed the infusion time limit?

**Table 1** - Comparison between ninth and tenth periods on questions regarding transfusion safety. Rio de Janeiro, RJ, Brazil, 2019

		Question 4	Question 5	Question 6	Question 7
<b>9th Period</b>					
<b>Hits</b>	Absolute Frequency	5	21	6	5
	Relative Frequency	0,22...	0,95...	0,27...	0,22...
	Relative Percentage	22,72%	95,45%	27,27%	22,73%
<b>Errors</b>	Absolute Frequency	3	1	13	6
	Relative Frequency	0,13...	0,04...	0,59...	0,27...
	Relative Percentage	13,64%	4,55%	59,1%	27,27%
<b>don't know</b>	Absolute Frequency	14	0	3	11
	Relative Frequency	0,63...	0	0,12...	0,5
	Relative Percentage	63,64%	0%	13,63%	50%
<b>10th Period</b>					
<b>Hits</b>	Absolute Frequency	12	15	12	13
	Relative Frequency	0,8	1,0	0,8	0,86...
	Relative Percentage	80%	100%	80%	86,6%
<b>Errors</b>	Absolute Frequency	3	0	2	1
	Relative Frequency	0,2	0	0,13...	0,06...
	Relative Percentage	20%	0%	13,3%	6,7%
<b>don't know</b>	Absolute Frequency	0	0	1	1
	Relative Frequency	0	0	0,06...	0,06...
	Relative Percentage	0%	0%	6,7%	6,7%

Source: Own authorship.

The third part of the questionnaire was about transfusion reactions; the answers are shown in Table 2, whose questions eight, nine, 10, and 11 refer to the following questions, respectively: Is it characterized as a transfusion reaction acute changes in blood pressure, both for hypertension and hypotension? When a transfusion reaction occurs, the 0.9% saline solution should be immediately infused, and the transfusion should only be interrupted if there is no improvement in the symptoms presented; It is characterized as a transfusion reaction the temperature elevation during a transfusion from ?

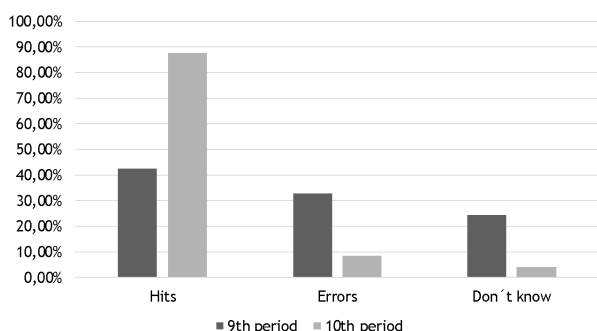
**Table 2** - Comparison between ninth and tenth periods on the questions regarding transfusion reactions. Rio de Janeiro, RJ, Brazil, 2019

		Question 8	Question 9	Question 10	Question 11
<b>9th Period</b>					
<b>Hits</b>	Absolute Frequency	14	14	4	6
	Relative Frequency	0,63...	0,63...	0,18...	0,27...
	Relative Percentage	63,64%	63,64%	18,18%	27,27%
<b>Errors</b>	Absolute Frequency	0	1	18	16
	Relative Frequency	0	0,04...	0,81...	0,72...
	Relative Percentage	0%	4,55%	81,82%	72,73%
<b>don't know</b>	Absolute Frequency	8	7	-	-
	Relative Frequency	0,36...	0,31...	-	-
	Relative Percentage	36,36%	31,81%	-	-
<b>10th Period</b>					
<b>Hits</b>	Absolute Frequency	14	15	11	13
	Relative Frequency	0,93...	1	0,73...	0,86...
	Relative Percentage	93,3%	100%	73,4%	86,7%
<b>Errors</b>	Absolute Frequency	1	0	4	2
	Relative Frequency	0,67...	0	0,26...	0,13...
	Relative Percentage	6,7%	0%	26,6%	13,3%
<b>don't know</b>	Absolute Frequency	0	0	-	-
	Relative Frequency	0	0	-	-
	Relative Percentage	0%	0%	-	-

Source: Own authorship.

Figure 3 illustrates the comparison of the total number of correct answers and errors in the questionnaire answered by the students, where a high variation is observed in relation to the answers of the 10th period and, when compared to the 9th period, this variation is low.

**Figure 3** - Comparison between the ninth and tenth periods regarding the performance in the answers to the questionnaire applied. Rio de Janeiro, RJ, Brazil, 2019



Source: Own authorship.

## DISCUSSION

The profile of the academics who participated in the research is predominantly female. The average age is 23.8 years in the 9th period and 26 years in the 10th period. There is an age difference among the students, those in the ninth period range between 22 years and 26 years, while the tenth period students are aged between 22 years and 33 years. The sample group studied reflects the national data regarding nursing graduation in the aforementioned aspects.<sup>9</sup>

The data will be discussed through the following categorizations: Self-perception of learning about hemotransfusion by fifth-year nursing students; Patient safety in the preparation and execution of the hemotransfusion procedure; Performance evaluation of ninth and tenth period students on transfusion safety.

### Self-perception of fifth-year nursing students' learning about hemotransfusion

The results found (Figure 2) show that although the students affirm that the content on hemotransfusion was taught during the undergraduate course (77.7% and 93.3% of the 9th and 10th grade students, respectively), it was not significantly absorbed by the students, since more than half of them (59.1% and 53.3% of the 9th and 10th grade students, respectively) refer that they do not feel prepared to perform the procedure. Regarding the educational process, a reference on the subject is Paulo Freire, who states that significant learning happens when the student is able to understand what he is learning, assimilating it to a previous knowledge, where the content brings meaning to the learner.<sup>10</sup>

### Patient safety in the preparation and execution of the hemotransfusion procedure

The undergraduates were evaluated regarding the necessary professional qualification, patient identification, materials, and correct technique to perform the hemotransfusion procedure. Table 1 shows the response profile presented by the students, where the 9th period undergraduates had a high percentage of correct answers in question five (95.45%), which addressed the issue of patient identification. The question also had the highest number of correct answers (100%) among 10th period students, who underwent the intervention. Correct patient identification is goal one of the six international patient safety goals developed by the World Health Organization.<sup>11</sup> In the blood transfusion process, double-checking ensures that the correct blood, blood component, or blood product is given to the right patient, with compatible blood group and Rh factor, and ensures that pretransfusion procedures are performed on the material to be infused.

The question with the highest number of incorrect answers differs between the two classes. In the ninth period, the highest rate of errors is found in question six (59.1%), where the use of materials during the procedure was addressed. In the tenth period, question four leads with the highest number of incorrect answers (20%), where the professional training needed to perform the procedure was addressed.

Although blood transfusion is a complex procedure that requires the nurse's performance, studies show that these professionals do not recognize its relevance. This fact, possibly caused by the scarcity of content offered by universities, in addition to the discrete number of *lato sensu* post-graduation courses directed to this field.<sup>12</sup> The topics selected in the questions refer to situations presented in nurses' practice. The uncertainties in answering the questions presented are a reflection of the doubts that these future professionals will present in their professional activity.

The administration of blood, blood products, and blood products may result in an adverse reaction, even if the entire procedure has been performed correctly. However, most fatal reactions are related to human error, such as errors in the identification of patients and samples, use of inappropriate materials, and factors related to the donor and recipient.<sup>13</sup> It is essential that nurses have the knowledge to perform this procedure safely.

The data presented in Table 2 show that students who underwent training had a higher percentage of correct answers (88.3% correct answers and 11.7% errors) when compared to students who did not undergo the intervention (43.2% correct answers, 39.8% errors, and 17% chose the option I do not know). The 9th period students, who did not receive the explanations about the topic, had higher number of correct answers in questions eight and nine (63.64% in both).



Question eight asks if changes in blood pressure, either higher or lower, characterize a transfusion reaction, and question nine asks if, when identifying a transfusion reaction, one should infuse 0.9% saline solution, and only stop infusing the blood component if symptoms do not improve. The 10th period students also had the highest number of correct answers for these questions (93.3% and 100%, respectively).

It was identified that the question with the highest number of correct answers was question 10, for both periods, which inquires about the students' knowledge on how much of an elevation in body temperature characterizes a transfusion reaction, (81.82% for the 9th period and 26.6% for the 10th period). In question 11, which asks about the maximum time that characterizes an immediate transfusion reaction, the divergence in the number of errors between the two classes is remarkable (72.73% of the 9th period students and 13.3% of the 10th period students).

As nurses remain 24 hours providing continuous care to customers, they play a key role in identifying transfusion reactions, since they are the main players, along with their teams, in hemotherapeutic care. In most institutions, the nurse is responsible for receiving the blood component and checking important criteria to start the transfusion, including providing all the necessary information to the client and his family members.<sup>14</sup>

Transfusion reactions are classified as immediate or delayed. The immediate reactions are those occurring during the transfusion and up to 24 hours after it, and the late reactions are those occurring 24 hours after the transfusion.<sup>15</sup>

Vital signs are essential in identifying a transfusion reaction. When altered, they may characterize an adverse reaction to hemotransfusion, such as volume overload, which may cause hypertension. On the other hand, an acute hemolytic reaction may cause arterial hypotension. Body temperature is also important, since an increase of at least 1°C of the initial temperature characterizes one of the most frequent reactions, the non-hemolytic febrile reaction.<sup>15</sup>

When a possible adverse reaction is identified, the healthcare team should immediately stop the transfusion and infuse 0.9% saline solution, the amount of which is at the doctor's discretion and the clinical evaluation, until the conduct to be taken is defined. Decision-making and quick action is one of the factors that increase the chances of recovery and reduce the damage caused to the client.<sup>15</sup>

Given the nurse's responsibility to supervise the transfusion process, whether pre, trans or post, considering the data analyzed and comparing the students' performance, it was possible to observe a positive highlight for the students who received the training. These students, who are about to leave the academy and apply for a job, where they will act as team leaders. Transfusions are performed within the hospital environment and are considered life-saving and disease-treating practices, requiring trained and skilled professionals for their handling and effective result.<sup>16</sup>

## Performance evaluation of ninth and tenth period students on transfusion safety

The group selected through the convenience sample to be submitted to the intervention was the tenth period. Figure 3 shows that the percentage of correct answers to the questions answered was 87.5%, which demonstrates that the students made good use of the content taught at a level higher than 85%. The observed data show that these students are confident in their answers, since the times they chose the answer "I don't know" were minimal, totaling 4.2% of the answers. Despite the positive result, it must be taken into account that the teaching-learning process should not be based only on the quantitative and classificatory evaluation practice, that is, considering only the numerical and percentage results of the student. The teaching-learning process has to seek the potentiality of the student, to promote the student's role in the construction of his own knowledge, so that he can learn effectively<sup>17</sup>.

After data analysis, we identified the number of correct answers (42.61%), errors (32.96%), and I don't know (24.43%) in the 9th period class. The 10th period, the group that received training on the specific theme, had a different result from the other group (87.5% right answers, 8.3% wrong answers, and 4.2% did not know how to answer the questions). These data show that even though they are in the final phase of the course, future nurses are not prepared to provide assistance in transfusion therapy, which causes concern, considering that any mistake during the process can be fatal.

From the data collected, it was possible to identify that the group that received the previous training had a significant positive result, as opposed to the other group that did not receive the training. It is concluded that the students who are about to receive their nursing degrees, both from the ninth and tenth periods, did not show the expected knowledge about the transfusion therapy process.

## CONCLUSION

The blood transfusion procedure is performed by nurses, and knowledge on the subject is of great importance for it to be performed safely, avoiding errors in the management of the steps and intervening upon possible transfusion reactions. At a time when the issue of patient safety is being debated and researched, it is understood that the first safety strategy is the mastery of technical and scientific knowledge by nurses to perform their private competencies efficiently and effectively.

Thus, the importance of encouraging undergraduates to review the content about the procedure during undergraduate nursing, especially in supervised internships, reinforcing the knowledge acquired and reaching maximum levels for quality care is highlighted.

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### Corresponding author

Savya Mendonça Gomes da Silva

Address: Rua Manoel Pacheco de Carvalho, 4, Centro  
Niterói/RJ, Brazil

Zip code: 24.030-290

Email address: mendoncasavya@gmail.com

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